

profiling and imaging capability, will form the foundation for a range of systems tests and mesoscale research field experiments never before possible. The USWRP places high priority on developing science plans and defining specific implementation activities for: (a) fundamental research, (b) forecast applications, (c) predictive modeling, (d) data collection, analyses, and management, and (e) education and training. While there has been some early attention to item (d) with regard to the proposed multiscale field experiment, the USWRP will work with the scientific community to address the larger issue of *multiscale experiments versus smaller efforts focussed on regional forecast problems, as vividly demonstrated in the recent outbreaks of severe weather over the southeastern U. S.* Specific field experiments and other activities will be developed by the USWRP Scientific Advisory Committee (SAC) working in conjunction with the mesoscale research community, and approved by the SAR interagency working group. Field experiments of the CME-type will depend crucially on the following factors:

- Successful budget initiatives in FY95 and beyond by NOAA and the other SAR agencies
- The modernization deployment schedules for the new observing systems
- Linkage and optimization of field systems with those of other related programs, such as ARM, GEWEX, and AWP.

There are common objectives and database requirements between the USWRP and other programs (as discussed below), so *non-competitive synergism between the various programs must be established.* It is also incumbent upon the mesoscale modelling community to closely examine their observing system requirements for future field experiments. We must perform OSSE-type experiments to see if the large number of special balloon-borne soundings required in previous field programs such as STORM-FEST, *a major cost driver,* can be relaxed by incorporating the higher spatial and temporal resolution inherent in the new operational observing systems like NEXRAD, wind profilers (some with RASS sounders), and ASOS.

N94-24376

2.2 GEWEX Continental-scale International Project (GCIP)

Paul Try

The Global Energy and Water Cycle Experiment (GEWEX) represents the World Climate Research Program activities on clouds, radiation, and land-surface processes. The goal of the program is to reproduce and predict, by means of suitable models, the variations of the global hydrological regime and its impact on atmospheric and oceanic dynamics.

However, GEWEX is also concerned with variations in *regional* hydrological processes and water resources and their response to changes in the environment such as increasing greenhouse gases. In fact, GEWEX contains a major new international project called the GEWEX Continental-scale International Project (GCIP), which is designed to bridge the gap between the small scales represented by hydrological models and those scales that are practical for predicting the regional impacts of climate change. The development and use of coupled mesoscale-hydrological models for this purpose is a high priority in GCIP. The objectives of GCIP are to:

- Determine the time/space variability of the hydrologic and energy budgets over a continental scale region.
- Develop and validate macroscale hydrological models, related high resolution atmospheric models, and coupled hydrologic/atmospheric models.
- Develop and validate information retrieval schemes incorporating existing and future satellite observations coupled with enhanced ground-based observations.
- Provide a capability to translate the effects of a future climate change into impacts on water resources and temperature on a regional basis.

GCIP would benefit from a cooperative multiscale experiment by providing data: (1) for helping to provide closure on the water and energy budgets without the need for reliance upon residuals from conventional rawinsonde observations; (2) for initializing and verifying high resolution atmospheric models, land surface, and convective parameterization schemes; and (3) as input into hydrological calculations and models. The basic premise for GCIP is that, to the extent possible in developing coupled hydrologic-atmospheric models, it will rely upon operational or planned special observing programs in the Mississippi River basin region, assemble the relevant data sets, and develop a data management system to support the program. Of particular importance are high-resolution data products consisting of precipitation derived from the WSR-88D radars and satellites, winds from the profiler network, and temperature and water vapor profiles from rawinsondes, aircraft, and satellites.

The data collection part of the GCIP Implementation Plan is now in final draft form, although the research program and data management volumes await completion. The Science Plan has been available for some time, and the hydrology activities are now progressing with the establishment of a hydrology subpanel. Plans for providing GCIP Initial Data Sets (GIDS) on CD-ROMs prior to the beginning of the Enhanced Observing Period (EOP) in 1995 are being finalized. GIDS will consist of the following components:

- GIDS-1: the GCIP Static Data System Test will make use of existing operational and experimental capabilities to provide data from the period 1 Feb-30 April 1992, which includes the STORM-FEST data period of 1 Feb-15 Mar 1992

- GIDS-2: an Initial Retrospective Data set consisting of operational data collected in 1987-88 for the purposes of conducting diagnostic and evaluation studies of current capabilities to compute energy and water budgets within or over the GCIP region, in concert with the Satellite Pathfinder studies

- GIDS-3: the GCIP Integrated Systems Test (GIST), scheduled for a three-month period sometime between 1 April and 30 September 1994 for the purpose of evaluating the capabilities of the existing observing networks, operational models, and data centers to support the GCIP initial diagnostic, evaluation, and modeling studies as a buildup for the GCIP EOP. This test will utilize existing operational data and any other auxiliary data which could be provided by other programs (e.g., ARM and the Oklahoma mesonet network). The GIST region is shown in Fig. 1. GCIP is considering providing augmented observations in the form of some added soundings and surface energy budget stations for a 5-7 year period at some of the sites composing the profiler hexagonal array that surrounds the CART site, as discussed in section 2.5.

The Enhanced Observation Period of GCIP would benefit from augmentation of the nation's observing capabilities during the latter part of this decade, with an increase in radiosonde data, support for the development of the Commercial Aircraft Sensing of Humidity (CASH) program, and the possible establishment of several radiation flux tower systems across the central U.S., 915 MHz wind profiler systems, and ground-based DIAL (Differential Absorption Lidar) systems along the southern rim of the U.S. to measure the low-level inflow of moisture into the GCIP continental region from the Gulf of Mexico. These and other supporting measurement systems for GCIP are depicted in Fig. 2.

2.3 GEWEX Cloud Systems Study (GCSS) *Mitch Moncrieff*

N94-24377

The GEWEX Cloud Systems Study (GCSS) program seeks to improve the physical understanding of sub-grid scale cloud processes and their representation in parameterization schemes. By improving the description and understanding of key cloud